

Application No.: 10/603,924

Docket No.: JCLA7109

REMARKS**Present Status of the Application**

Applicants would like to thank Examiner for the careful review of this application. The Office Action objected claims 21-26 as being the numbering of claims being not in accordance with 37 CFR 1.126. The Office Action also rejected claims 1-2, 4-7, 25-30 and 31(21)-36(26) under 35 U.S.C. 103(a) as being unpatentable over hirabayashi et al. (US 5,575,885) (hereinafter hirabayashi) in view of Hsu (US 6,096,633) (hereinafter Hsu). Claims 1 and 31-36 have been amended and new claims 37-41 have been added to more appropriately define the invention and claims 3 and 25-30 have been cancelled. The amendment is fully supported by the original application filed on June 24, 2003. No new matter has been added. Upon entry of the amendment, Claims 1, 2, 4-7 and 31-41 are pending.

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DISCUSSION OF OFFICE ACTION REJECTIONS**Response To 35 U.S.C. 103 (a) Rejection**

Claims 1-2, 4-7, 25-30 and 31(21)-36(26) are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirabayashi et al. (US 5,575,885) (hereinafter Hirabayashi) in view of Hsu (US 6,096,633) (hereinafter Hsu).

Applicant traverses the rejection of claim 1 under 35 U.S.C. 103(a) as being unpatentable over Hirabayashi in view of Hsu because a prima facie case of obviousness has not been established by the Examiner.

To establish a *prima facie* case of obviousness under 35 U.S.C. 103(a), each of three requirements, must be met. First, the reference or references taken alone or combined must teach or suggest each and every element recited in the claims. Second, There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one skill in the art, to combine the reference in a manner resulting in the claimed invention. Third, a reasonable expectation of success must exist. Moreover, each of three requirement must "be found in the prior art, and not be based on applicant's disclosure". See M.P.E.P. §2143, 8th ed., February 2003.

Applicants respectfully assert that Hirabayashi in view of Hsu is legally deficient for the purpose of rendering claims 1 and 31 unpatentable for at least the reason that not every element of the claim was taught or suggested by cited references such that the invention as a whole would have been obvious to one of ordinary skill in the art.

The present invention specifically teaches "treating the silicon wafer using an aqueous

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solution of ozone and providing an inertial mechanical force” as taught in claim 1 or “treating the substrate using an aqueous solution of ozone and providing an inertial mechanical force so that contaminants on a surface of the substrate are removed” as taught in claim 25.

The technical significant of the foregoing limitations is that utilizing the inertial mechanical force, for example, as provided in a metal CMP station, a buffer CMP station or a cleaning station, ozone molecules react with the residual contaminants or carbon-rich particles on a wafer surface and are removed more efficiently. Hirabayashi, on the other hand, simply teaches dipping the substrate with the buried interconnecting layer into an aqueous dissolved ozone solution for 3 minutes, followed by dipping into a hydrofluoric acid solution (col. 15, line 30-35). Contrary to the Office assertion, the application of mechanical force in the cleaning step is not routine optimization. Conventionally, a post CMP cleaning only conducts with DI water in conjunction with some form of brushing, jetting or ultrasound. The present invention, in addition to a regular post CMP cleaning with DI water, further takes advantage of a mechanical cleaning with an ozone solution, for example, by delivering an aqueous solution of ozone a metal CMP station, a buffer CMP station or a cleaning station. Utilizing the inertial mechanical force of the polishing pad, the ozone molecules react with the contaminants on the wafer surface, and the reacted particles are carried away by the solution. Subsequent to the mechanical cleaning with ozone solution, a regular post CMP wafer treatment may perform in accordance to the present invention. Therefore, Hirabayashi fails to teach or disclose the claimed invention. Further, Hirabayashi lacks any suggestion that the reference should be modified in a manner required to meet the claims.

Even Hsu teaches polishing the metal layer by using chemical-mechanical polishing or

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etch back, the combination of Hirabayashi and Hsu still fails to teach or suggest the claimed features of the present invention. Applicants therefore respectfully submit that Hirabayashi in view of Hus does not render the present invention of claims 1 and 31 unpatentable. Applicants respectfully request that the Office withdraw of the rejection of claims 1 and 31.

Dependent claims 2-7 and 32-36 are submitted to be patentably distinguishable over the prior art of record for at least the same reasons as independent claims 1 and 31 from which these claims respectively depend, as well as for the additional features that these claims recite. Accordingly, Applicants request that the Section 103 (a) rejection to claims 1, 2, 4-7 and 31-36 be withdrawn.

Applicant has cancelled claims 25-30. Thus, the rejection of claims 25-30 is moot.

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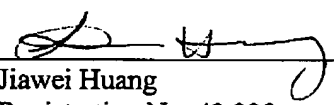
CONCLUSION

For at least the foregoing reasons, it is believed that all pending claims 1, 2, 4-7 and 31-41 are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

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Respectfully submitted,
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